Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

In the Matter of	)	
	)	
Usage of the Public Switched Network by Information Service and Internet Providers	)	CC Docket No. 96-263
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Comments

of

The Southern New England Telephone Company

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March 24, 1997

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The Southern New England Telephone Company (SNET) hereby files its comments in the above captioned matter, pursuant to the Notice of Inquiry (FCC 96-488) released December 24, 1996 (NOI) by the Federal Communications Commission (Commission). SNET is the incumbent local exchange carrier (ILEC) providing local telephone service to most of the state of Connecticut with just over two million access lines.[1]

I. INTRODUCTION AND SUMMARY

The public has benefited greatly from the accessibility to the information highway through telecommunications. The Internet -- a vast international "network of networks" -- has grown dramatically and is the most significant factor in the explosion of the availability of information. The Commission's long standing temporary exemption of Enhanced Service

[1] SNET supports in full the Comments of the United States Telephone Association (USTA) filed today in this proceeding.

Providers (ESPs), including Internet Service Providers (ISPs), from application of interstate access charges has undoubtedly contributed to the rapid growth of the Internet.

It is now time for the Commission to decide the regulatory treatment of Internet service providers (ISPs). SNET strongly recommends that the Commission release a Notice of Proposed Rulemaking (NPRM) to this effect as soon as it adopts reformed access charge rules.

There are three issues the Commission should consider for inclusion in the NPRM: 1) implications of economic inefficiencies, including the ESP exemption and reciprocal (or mutual) compensation; 2) ways to manage network congestion; and 3) the financial and network risk to ILECs and their customers. These issues, discussed in detail below, are significant to SNET and the industry because the demands placed on ILEC networks by ISP traffic have increased dramatically.

Specifically, the current Internet marketplace has experienced at least 100% growth every year for the past ten years.[2] There were approximately 7.5 million households connected to the Internet by January 1996.[3] Forecasters expect twenty-six million customers to be connected by the end of 1997.[4] Estimates are that more than 40 million people are using the Internet, with projections of 400 million by the year 2000. Internet traffic is growing at 6% per month, with 9.5 to 10 million hosts on the Internet. There are more than 4,000

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[2] Meaningful statistics on Internet growth and usage are elusive at best, as there is no centralized organization to track and account for statistics such as these. The Internet itself contains many sites with relevant data, but much is outdated and not comparable. See, e.g., http://www.mit.edu/people/mkgray/net/internet-growth-raw-data.html; http://www.letswep.com/stats.html; http://ww.tomco.net/~tmonk/cooperation.html; http://www.muzik.com/info/demographics.html; http://www.merit.net/nsfnet/statistics/history.hosts.

[3] USTA Dispatch No. 96-120, Nov. 12, 1996.

[4] McCullouch, D., "Too HOT to Handle?", Telephony, July 29, 1996, pg. 34, 35.

Internet providers -- from giants like AT&T, Worldnet and the Microsoft network, to "mom-and-pop" businesses. This information explosion -- along with the Commission's policy exempting ISPs from usage-based access charges,[5] the Telecommunications Act of 1996,[6] the Interconnection Order,[7] and the Access Reform docket[8] -- has increased the urgency to decide the regulatory treatment of ISPs.

As described in Section IV.A. below, the well-served assumptions SNET has used to design and engineer its public switched telephone network (PSTN) for voice traffic are coming under severe pressure. These pressures result from significant changes in calling patterns and telephone usage stemming from access to the Internet. The PSTN is designed for voice traffic. This voice network is established using engineering algorithms for voice traffic patterns, utilizing actual usage data. However, as soon as an end user connects a modem to the voice network, the user no longer intends to use the voice network for voice. Rather, that end user transmits data, and the voice traffic assumptions are no longer valid. Data users

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[5] MTS and WATS Market Structure, Docket No. 78-72, Memorandum Opinion and Order, rel. Aug. 22, 1983, 97 FCC 2d 682, 711-722 (1983) (Exemption Order). See also Amendments of Part 69 of the Commission's Rules Relating to the Creation of Access Charge Subelements for Open Network Architecture, CC Docket No. 89-79, Policy and Rules Concerning Rates for Dominant Carriers, CC Docket No. 87-313, Report and Order & Order on Further Reconsideration, FCC 91-186, rel. July 11, 1991 (6 FCC Rcd No. 15, 4524, 4534).

[6] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56. *to be codified at* 47 U.S.C. §§ 151 *et seq.* (the Telecommunications Act).

[7] In the Matter of Implementation of Local Competition Provisions in the Telecommunications Act of 1996, CC Docket No. 96-98, and Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers, CC Docket No. 95-185, First Report and Order, released August 8, 1996, FCC 96-325, *petition for review pending and partial stay granted, sub nom.* Iowa Utilities Board et. al v. FCC, No. 96-3321 and consolidated cases (8th Cir. Oct. 15, 1996), *partial stay lifted in part,* Iowa Utilities Board Et al. v. FCC, No. 96-3321 and consolidated cases (8th Cir. Nov. 1, 1996) (Interconnection Order), para. 292.

[8] Access Charge Reform, CC Docket No. 96-262, Notice of Proposed Rulemaking (FCC 96-488) released December 24, 1996.

stay on line for longer periods of time at different times of the day, employing the facilities designed for a different purpose. "[T]remendous and unexpected increases by Internet users who linger for hours on facilities that have traffic algorithms based on three- to five-minute phone calls are wreaking havoc on the traditional network model."[9]

ILECs have been unable to forecast network or traffic growth accurately, as ISPs have generally either been unwilling or unable to provide ILECs with accurate forecasts of their network requirements. The result is ILECs have carried the financial burden of solving problems created by ISP usage over the last fourteen years. Competitive access providers (CAPs) are now able to serve the ISPs without incurring similar financial burdens.

In fact, CAPs have an added incentive to capture ISP traffic because of mutual compensation arrangements. There is an opportunity for CAPs to gain significant revenues while they incur little if any additional costs. Given the current distribution of customers, if an ISP obtains its local service from a CAP, the vast majority of its local traffic would originate on the ILEC network and would terminate on the CAP network. The result would a vastly disproportionate level of traffic paid to the CAP under mutual compensation, which could approach millions of dollars per year. SNET should not incur additional costs through payment of mutual compensation because it has lost competitive local lines to a CAP provider.

With this filing, SNET submits data in response to the Commission's request for specific information on the characteristics of information service usage and its effect upon the network. SNET's submission highlights several points: 1) the highest usage for an average PSTN line is 3.7 CCS, while the highest usage for an average ISP line is 35.9 CCS; 2) for the

[9] Snyder, B., "Pileup on the public network: Two studies trace the congestion Internet usage is creating," Telephony, August 26, 1996, pg. 28.

office studied, 99.2% of the ISP lines in that office are constantly in use between the hours of 7 p.m. and midnight; 3) 5% of the access lines use 35% of the office capacity during the busy hour; and 4) SNET's network is being used by ISPs to meter and control subscriber calls to the ISP, which is creating network congestion for all subscribers.

The Commission must take this opportunity to explore the various issues facing the industry in light of the dramatic changes occurring in telecommunications today. SNET also recognizes that there are a number of ways for the Commission to approach the problem equitably. SNET recommends that the Commission issue a Notice of Proposed Rulemaking as soon as possible to evaluate the range of possible regulatory alternatives. These alternatives should include applying reformed access charges to ISP access to the ILEC networks.

II. THE ESP EXEMPTION IS CAUSING ECONOMIC INEFFICIENCIES THAT ARE DECREASING THE EFFECTIVENESS OF ILEC NETWORKS

Fourteen years ago, the Commission temporarily exempted ESPs, including ISPs, from the application of ILEC interstate access charges.[10] This exemption enables ISPs to subscribe to local exchange lines, instead of interstate access services from ILEC tariffs. This policy allowed usage-based data services to be provided over flat rated lines, regardless of volume. The Commission's exemption policy is undoubtedly contributing to the rapid growth of the Internet, by allowing ISPs to minimize their cost per subscriber transaction. This policy also redistributes the cost of Internet access from the ISPs to the ILEC's other subscribers.

[10] See Exemption Order.

A. Flat Rated Exchange Lines For ISP Access Do Not Promote Economic Efficiency.

As ISPs use flat-rated exchange access lines for incoming calls from their subscribers, neither ISPs nor their subscribers incur increased costs for increased usage. ISP subscribers stay on these local lines for average lengths of time greater than ILECs have anticipated or engineered for. The result is an increase in ILEC costs with no means of recovery from the ISPs. This imbalance -- increasing costs, and lack of cost recovery -- is exasperated by the high level of activity ISPs have generated on the local networks, as opposed to the Commission's regulations prohibiting usage based rates.

It is important to describe how ISPs use SNET's network. In order to provide service to their Internet subscribers, ISPs in SNET's serving area traditionally order flat-rated business service lines in large quantities, and frequently use them in an overflow (e.g., remote call forwarding) arrangement. Only one main number is published for ISP subscribers to dial, and if a line is busy the call is forwarded to the next local exchange line.

SNET provisions basic local exchange lines as circuit-based lines of narrow bandwidth. These lines are engineered using traffic assumptions for voice grade (not data) service. ISPs choose the local exchanges for their lines in order to maximize the extended local calling aspect of their subscribers' calling areas. Toll-free access to SNET's 86 exchanges in Connecticut can be obtained from just 13 exchanges.

ISPs prefer the flat rate exchange tariffs for these services because the incoming usage on these facilities is maximized without any additional increase in cost. The ILEC is paid a flat rate regardless of the amount of time the ISP access lines are in use. Stated differently, the absence of a terminating usage-based rate structure incents the ISPs to

encourage their subscribers to stay on line as long as they like, without financial or network consequences to either the end users or the ISP.

During busy hours, however, subscribers attempting to dial in to the ISP can receive continuous busy signals. The ISP in this regard might be using the ILEC to control and meter the inward flow of calls to its limited capacity modem banks. Network congestion occurs, speed of dial tone diminishes, and all users of the network -- ISPs, their subscribers, the ILECs, and end users -- receive poor service. Flat-rated terminating usage is not economically efficient because of the costs it imposes upon all users of the network.

Removal of the Commission's ESP exemption will produce more economic efficiency for all participants. ISPs would then pay usage-sensitive rates for access to the ILECs local networks, just as interexchange carriers (IXCs) do, eliminating the purchase of exchange lines. ISPs would be incented to utilize ILEC digital, packet-based network access, a more efficient provisioning of service to ISPs due to the wider bandwidth. This service would also provide better service to the ISP subscribers because network congestion would be eased, if not eliminated, and transmission of information would be faster and more reliable.

Changing from a flat-rated access line rate to usage sensitive pricing would not cause pricing distortions to either the ISP or its end user subscribers. A concept of "pay for what you use" is a fundamentally sound pricing method and is in widespread use today. "Per-unit" pricing has been in place for a very long time, for everything from electricity to movies-on-demand. SNET believes that a change in the ISP rates will not deter use of the Internet, and in fact will make access to the Internet more available by reducing network congestion.

SNET recognizes that removing the temporary exemption, and permitting ILECs to apply reformed access charges to all ESPs, including ISPs, will be a difficult decision for the Commission. However, this is the correct action for the Commission to take.[11]

In brief:

> Opportunities abound for providers and users alike. The first step is to abandon the pseudo-socialist model that is frustrating more Internet users each day and compromising the performance of the telecommunications network. Some form of rational usage-based pricing is essential if the Internet is to realize its potential.[12]

B. A Rational Cost-Price Relationship Is Needed To Bring Internet Usage Into Economic Efficiency.

SNET believes that governmental protection of a large, well organized and rapidly growing group of network users, the ISPs, is no longer needed. The ISP industry has matured, and its participants are highly competitive companies, many of whom are world-wide providers, and none of whom need to be defended by an outdated regulatory policy. Now that the Commission's goal of wide proliferation of ESP and ISP services is accomplished, it must discontinue the interim ESP access charge exemption.

In the robust telecommunications environment in which SNET now operates, the presence of many competitive local exchange carriers (CLECs) and CAPs provides an interesting arbitrage opportunity for ISPs to carry their traffic either on the ILEC network, or on

[11] The Commission has not changed its primary objective, nor has the Telecommunications Act required any such change, "to assess access charges on all users of exchange access, irrespective of their designation as carriers, non-carrier service providers, or private customers." Exemption Order at para. 54 (footnote omitted, emphasis added).

[12] Firdman, E., "How to Unclog the Internet," The New York Times, February 9, 1997, pg. D-14.

the CLEC network. Therefore, rational relationship between costs of a service incurred on a usage basis, and the price for that service, should now be established by the Commission.

An efficient pricing plan is required to avoid the legal, regulatory and market tangles that the current system provokes. That plan should be based upon a cost recovery mechanism that reflects the way costs are incurred. A rational cost-price relationship, based upon a usage-sensitive pricing plan, will return economic efficiency to the provision of Internet services by the ILECs.

III. ISPS DO HAVE INCENTIVE AND OPPORTUNITY TO LEAVE THE ILEC PSTN NETWORK.

There are a number of circumstances which cause the ISPs to be very attractive marketing targets for the CAPs, placing all ILECs at a distinct disadvantage when competing for the ISP business. These circumstances are produced by a combination of regulations surrounding: 1) mutual compensation, 2) interconnection, 3) access, and 4) exchange service.

CAPs are incented to capture ISP traffic because their switches are currently underutilized. As CAPs begin to capture local market share, ISPs become an attractive stream of revenues while CAPs position themselves with end users. CAPs however, have an added incentive to capture ISP traffic: mutual compensation.[13]

Mutual compensation is the local traffic alternative to access charges. Local exchange carriers are required to compensate each other for the exchange of originating and terminating local traffic between carriers. Local exchange carriers are also required to negotiate a reciprocal charge per terminated minute of use. The main assumption of mutual

[13] The reciprocal (or "mutual") compensation rules are encoded in Part 51, Interconnection, Subpart H, §§ 701-717.

compensation is that originating and terminating usage roughly would balance out between the carriers. Any imbalance or difference in that traffic would be periodically settled by a payment from one carrier to the other.

The problem for the ILEC and the opportunity for the CAPs arises from the fact that traditional voice traffic patterns do not occur over the exchange network access lines utilized by the ISPs. Should an ISP obtain its local access line service from a CAP, the vast majority of the traffic to the ISP would originate on the ILEC network, and would terminate on the network of the CAP. The result, not contemplated or provided for in the Commission's rules, is a vastly disproportionate level of terminating traffic to the CAP, for which the ILEC must compensate the CAP under the requirements of mutual compensation.

To depict this situation, SNET provides Exhibit 1, showing the original, intended result of mutual compensation, and the consequential impact of ESP/ISP traffic terminating on a CLEC network on a mutual compensation basis.

In brief, ESPs/ISPs and CLECs are perversely motivated by the Commission's mutual compensation rules to terminate as much traffic to ISPs on the CLEC network as possible, while originating no traffic whatsoever. Although the CAPs may be currently limited geographically, they have made these offers to ISPs in their major markets.

SNET has first-hand experience in this situation, as several CAPs in Connecticut are incenting ISPs to move their terminating traffic from the ILEC network to the CAP network, with offers such as: 1) free co-location of equipment, and 2) free or deeply discounted line rates based simply on the profit they will derive from payments by ILECs under mutual compensation. Under the current mutual compensation rules, SNET could be liable for payments of millions of dollars per year. In return, SNET would not receive any compensation from any party, because these lines would generate no originating traffic for termination on

SNET's network. Without a change to the rules of mutual compensation, this problem will continue to grow.

Under the current rules, the ILEC is completely disadvantaged. Currently, the ILEC receives revenue from the ISPs for the local exchange lines they use to collect their traffic; the ILEC also receives revenue from its end user subscribers for their local exchange lines. When an ISP moves its lines to a CAP or CLEC, the ILEC: 1) would no longer receive local access line revenue from the ISP, 2) would continue to receive exchange line revenue from the ISP subscribers for their local exchange lines, but 3) would pay the CAPs and CLECs mutual compensation on a usage basis for terminating traffic. This originating traffic is atypical of the traffic for which the network was designed, and upon which local rates are established. The ISP exemption under the current rules increases the incentive for CAPs to capture this traffic, while the ILECs finance those ventures with compensation for the terminating traffic.

SNET is not seeking a method to prevent the CAPs from gaining ISPs as customers. The competitive market will produce shifts between providers of local service. However, SNET believes that it should not incur an additional cost, through payment of mutual compensation, if SNET loses these local lines. SNET requests that the Commission consider ways to account for ISP usage in the mutual compensation calculations. One method could be to develop an average usage per ISP line that would cap the mutual compensation payment.

IV. TRAFFIC GENERATED BY INTERNET USAGE IS FUNDAMENTALLY DIFFERENT THAN TELEPHONE VOICE TRAFFIC.

A. The Difficulties Caused By ISP Traffic Are Easily Identified.

Dial-up Internet data connections are placing an increased load on the PSTN. The majority of Internet access is through dial-up modem connections, which forces the PSTN to carry traffic for which it was not designed. Since the PSTN was designed to handle voice traffic with typical holding times of 3 to 4 minutes, the PSTN becomes severely strained when it must carry dial-up modem (data) calls averaging 27 minutes in duration. It is important to note that dial-up connections for this traffic require dedicated links through the switch and network during the duration of the call.

Applications such as E-mail and personal home pages accentuate the problem by encouraging users to connect and stay connected throughout the day. In effect, today's circuit switched network is getting converted into many private lines. This, coupled with the ISP multiline hunt groups operating at 30 to 35 hundred call seconds (CCS), causes shortages of available time slots (such as voice paths through the Central Office (CO) switch) that block switch access for residential and business customers.

CO and interoffice facility loads are pushed to near-capacity levels as subscribers go on-line. Traditionally network busy hours predominately peaked during normal business days. With ISP subscribers going on-line upon returning home from work or school at the end of the day, the busy-hour demand has moved to the evening.

In response to the Commission's request for specific data on the characteristics of information service usage and its effects upon the network.[14] SNET submits Exhibit 2 to

[14] NOI, para. 315.

demonstrate its Internet traffic patterns. While these data are just for one day and one CO, the characteristics are in fact replicated for other days and other offices which serve ISPs.[15] The data show that the highest usage for an average PSTN line is 3.7 CCS, while the highest usage for the ISP lines is 35.9 CCS.[16] It is significant to note that 5% of the office's access lines used 35% of the CO's capacity during the busy hour.

Most significantly, the ISP OVF (overflow) column shows that a high percentage of the ISP's subscribers are being blocked from accessing the ISP's services because the ISP is not subscribing to a sufficient number of access lines. The data show that a range of 36-78% of the callers to the ISP between 8 p.m. and 11 p.m. are receiving busy signals. These data comport with the data showing that all of the 336 ISP access lines are in use 99.2% (35.7 CCS ÷ 36 CCS) of the time between the hours of 7 p.m. and midnight. Busy signals block callers from accessing the ISP's service -- in effect, an SNET-provided metering or controlling effect for inflows to the ISP. The ISP may not be purchasing the correct number of access lines because it knows that its servers cannot handle the additional traffic on those lines, so it uses SNET's busy signals to limit access by dialers. Such a use is entirely contrary to network design parameters, and in fact violates SNET's local exchange tariff, as shown in Exhibit 3.[17]

To meet the increased traffic loads, CO equipment must be re-engineered and new equipment added, since this traffic is incremental to normal voice traffic and not

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[15] SNET can also provide these usage data for any or all of its central offices, for any number of days, and for any particular group(s) or class(es) of service, should the Commission desire.

[16] The theoretical capacity of an access line is 36 CCS, meaning that an access line would be in use for 60 seconds out of every minute for an hour (3600 seconds of capacity), or 100% of capacity.

[17] General Exchange Tariffs of The Southern New England Telephone Company, Part I, Sheet 4 (at para. 23).

complimentary. Within the last twelve months, 3,260 new trunks that can be directly attributed to ISP demand have been added to the network. This has resulted in an incremental investment of $3 million for switching and transport facilities and associated labor cost of $150,000. This represents a significant increase in the cost per line for CO equipment.

SNET concludes that the lengths of the calls to ISPs are much longer than the average voice telephone call. Calls to ISPs are "one-way," that is, only from a line in the exchange to the incoming ISP telephone number. These two facts are dramatically different than the assumptions used to engineer and construct the PSTN. Since the exchange lines to which ISPs subscribe are underpriced (relative to the usage they can generate), there is no incentive for ISP's to subscribe to data services. Data services would actually provide better service to ISPs and their customers, but these are priced on a usage-sensitive basis.

B. The Consequences Of The Changes In Network Usage Are Not So Easily Rectified.

As discussed in the previous section, SNET has seen drastic changes in network usage characteristics. The PSTN was designed to support short holding time calls and low usage characteristics per line. Both these fundamental design parameters are undergoing significant changes; certainly for those lines directly involved in the provision of Internet service (i.e., the ISPs' lines), and to a somewhat lesser degree those lines of the subscribers to Internet services.

The radical shifts in network usage characteristics has several direct consequences. First, the design tools used to size various network elements (e.g., interoffice facilities) cannot properly consider the new spread of usage characteristics; i.e., from the infrequent use and short holding times of traditional users, to the extremely high use and long holding times of

ISP lines. Extensive redesigns of these tools is necessary to include substantially different sizing algorithms. Until such tools are completely overhauled, an accurately modeled network with new design criteria is not yet possible.

Second, the core engineering premise on which Class 5 switches (local end offices) is based is "concentration." Concentration is the ability to have fewer internal switch paths for calls, and fewer switch resources (to provide dial tone, busy signals, recorded announcements) than if one had to have a call path, plus various switch resources, available for every end-user simultaneously. In the past, usage patterns enabled switches to be designed with typical concentration ratios of 6:1, 8:1 or even 10:1.

For example, consider an ISP with 100 CO lines. Rather than producing the usage characteristic of the traditional voice caller, these lines are in use nearly 100% of the time, especially as the ISP seeks the highest utilization (and hence financial payback) of its modems. However, if the fundamental design of the local switch serving this ISP has only one call path available for every eight lines, undesirable blockage will occur. Radical high-cost measures must then be taken by the LECs (e.g., constant line-load balancing -- the spreading of ISP lines throughout the switch's line modules), so ISP traffic will not overload switches for other subscribers.

The third consequence is the impact on interoffice facilities. Long holding times and significant usage increases are driving the requirement for a greater number of trunks between switches, where calls originate from Internet subscribers to the much smaller number of switches where the ISPs connect and pick up their subscribers' calls. Long holding times obviously make trunks unavailable to other callers. Given the rapid growth of Internet traffic and the lack of any requirement for ISPs to identify themselves and forecast traffic increases, the ILECs find it essentially impossible to predict the next interoffice facility "hot spot" where

blockage will occur. A substantial across-the-board increase in all trunk groups is well beyond the investment capability of the ILECs and is wasteful, since many facilities will sit idle and go underutilized if demand between some COs does not materialize.

A fourth area of impact involves end-user customers, including the ISPs themselves. As switch overload and interoffice trunk blockage take place, all end-user customers (be they Internet subscribers or simply traditional voice callers) will experience slow dial tone and/or blockage of calls (i.e., fast busy tones or recorded announcements advising the caller to try their call again later). These network impairments, due to spontaneous overload, have the ability to inhibit calls to emergency services, such as 911. As such, the impact to end-users can be more than frustrating, but indeed life threatening.

Lastly, a key impact is on the financial health of the ILEC's. As "receive only" users, ISPs originate no calls on their lines. Consequently, they may purchase the least expensive line possible from the ILEC and choose no vertical features, nor generate any toll calls. Thus, despite their extremely high usage characteristics on the lines they purchase, very little revenue is received by the ILEC. Additionally, Internet subscribers typically place non-revenue-generating, local calls to their ISP. In Connecticut, there are at least two ISPs with toll free access from all customers anywhere in the state. Thus, no revenue would be received by SNET, despite the need to significantly augment its interoffice facility network and build out the capacity of local switches. ILECs must be able to change how ISPs are charged, in order to be compensated for the costs they incur to provide ISP service, and to prevent service impairments from occurring routinely in the PSTN.

In sum, the radical change in call usage characteristics is having a substantial impact upon the PSTN. The changes witnessed both in Connecticut and nationwide are caused by

the use of modems that enable data calls (characterized by long holding times and high line usage) to utilize the voice network.

V. SNET HAS HAD TO MAKE MAJOR UNANTICIPATED CHANGES IN ITS NETWORK TO ACCOMMODATE INTERNET TRAFFIC.

SNET has recently experienced a number of problems in its network due to the high traffic patterns and loads generated by growing volumes of ISP terminating traffic. This growth in ISP terminating traffic has required SNET to construct additional central office and circuit facilities to accommodate the significant increase in terminating usage. SNET has initiated actions to solve service problems resulting from ISP usage loads. The costs of changes to ISP serving arrangements have not been borne by the ISPs.

The following two examples describe changes SNET was required to implement to address the problems.

Problem #1: "ISP #1" was served by a 110-line multi-line hunt group, plus an additional 10 lines not in hunt. All 120 lines were placed in two Integrated subscriber line concentrator (SLC) systems dedicated to this ISP from the ISP's serving central office to a carrier termination point near the ISP premises. (A third SLC system had been constructed in anticipation of growth but had no working lines at the time the problem occurred.) As ISP subscribers dialed the ISP's main local number, the hunt group directed calls through the SLC to the ISP modems on the ISP premises. Calls to ISP telephone numbers located in extended local calling area exchanges were remote-call-forwarded by the ISP to the ISP main number, increasing the toll free calling area for the ISP's customers, and increasing interoffice traffic.

The first indications of problems came from reports from SNET's local exchange customers to Repair Service of slow dial tone. SNET technicians could not readily identify the

cause or source of the reported troubles from the switch's diagnostic messages, and therefore contacted the Electronic Systems Assistance Center (ESAC), which is SNET's second tier of escalation to maintain service. The ESAC team determined the problem to be a service demand that exceeded the capacity of the switch's Subscriber Multiplex System (SMS) frame to which the ISP was assigned. After a coordinated effort of eight people working for six hours, three new SMS frames were established, and several hundred SNET exchange customers were re-homed into these new frames. In addition, personnel from engineering, switching operations and the ESAC spent several days establishing and reviewing a plan to load-balance the office. After additional facilities were installed in the central office, the ISP's service was re-homed on to the new dedicated equipment, giving this ISP a dedicated, non-blocking network for which they are not paying. The resolution of this problem generated over 275 person-hours of work, plus the early placement of several Universal SLC systems. SNET's general body of subscribers funded the solution to these problems.

Problem #2: "ISP #2" was served by a 240-line multiline hunt group from a 5ESS remote switch, via D-4 carrier terminal equipment, and 10 T-1 facilities to the ISP's premises. As soon as this ISP was brought into service, exchange service was immediately adversely affected by the concentration of high terminating usage and long holding time lines served by this remote. The Data Administration Group detected several impacts that degraded telephone service, such as: 1) delay in dial tone speed, 2) inter-office trunk blockages, and 3) decreased processor response time. Customer trouble reports to repair service also increased. The Switching Control Center was notified, and trouble analysis and resolution began immediately. Many people across several departments affected the solution, which was to re-home of the ISP customer from the 5ESS remote switch, to the host switch. This solution required:

- Establishing 10 new T-1 carrier facilities from the 5ESS host central office to the remote office location.
- Re-assigning the originating equipment (OE) from the remote to the host, via these new T-1 facilities.
- Re-homing the telephone number assignments from the remote switch to the host switch to retain the local service the customer required.
- Executing a coordinated out-of-hours cut-over with the ISP over a weekend.

The OE assignments in the host and special service facility assignments had to be assigned manually, and distributed across many line units in order to prevent further service degradation in the host office. Re-homing the OE assignments created a *permanent non-standard service arrangement* in the host switch due to the assignment of the *remote's* NXX code on the *host's* OEs. One hundred and fifty person hours were expended and early plant replacement was required to address this situation.

These are current examples of unanticipated actions SNET has taken in order to prevent degradation of service both to its general exchange customers, as well as its ISP customers.

VI. ILECS SHOULD HAVE FLEXIBILITY IN INTRODUCING NEW SERVICES TO MEET THE NEEDS OF ISPS AND END USERS.

SNET must be allowed to retain the flexibility necessary to meet the service and market needs of its present and potential customers. The Commission's pro-competitive policies should afford flexibility to all participants in the telecommunications marketplace. The role of regulation in this new environment is to unleash the power of supply and demand in meeting the ever-increasing needs of consumers. ILECs should not be restrained from equal

participation in the market. Nor should regulation continue to protect one class of users over another, once the Commission's policy objectives have been attained.

A fundamental change is required, to shift data traffic off the voice network and onto a network better optimized for such traffic. If 25% of SNET's customers were to exhibit typical Internet subscriber usage patterns, and the ISPs are able to handle the customer base, SNET has estimated it will take in excess of $500 million in new investment to build out the PSTN to carry data traffic.

In order to meet the needs of the developing marketplace for Internet services,[18] SNET is evaluating a new service specifically designed for ISP terminating usage. This new product will offer benefits to ISPs for improved service. The service is based upon a digital platform that will provide local telephone numbers for end users to call their ISP service. SNET's suite of dial-up, switched access options to its frame relay facilities could provide alternative communications paths for data traffic, including Internet packets, using efficient, progressive non-obsolete technologies. The new digital network will also have applications for use by IXCs and private networks, and can be customized to fit specific customer needs.

SNET is designing an Internet overlay digital data network aimed at significantly reducing interoffice facility overloads on the PSTN, as well as substantially reducing the switch congestion problems that exist at those end offices where the ISPs connect today. This Internet overlay data network can be summarized as follows:

- Establish one or more dedicated Internet switches. Such switches will have trunk only ports (i.e., T1 and PRI connections), with no basic line equipment.
- Establish trunks from each existing local end office switch to the dedicated Internet switch(es).

[18] Internet II will be activated soon, and Internet III is already in the design stage.

- Migrate ISP connections from today's local end-office switches (where many line connections exist) to the Internet overlay switch(es). Have ISPs connect to these dedicated switches using T1 or PRI facilities, consistent with the technology in the current modem shelves being purchased by most ISPs. Almost all ISPs of any significant size prefer these high capacity digital connections over the line side services they previously purchased.

- Direct traffic from subscribers in each local end office over the new trunks to the dedicated Internet switch(es) by virtue of newly established telephone numbers for each ISP. Discussions with several ISPs has indicated a strong willingness to accept new telephone numbers as part of the ability to participate in this new overlay architecture.

- In addition to T1 and PRI connections, consider offering ISPs high speed Frame Relay (packet data) connections. This will involve the placement of modem banks at the overlay switch site(s), connections from the modem banks to SNET's Frame Relay network, and then circuits from the Frame Relay network to the ISP's location, where such circuits directly connect to the ISP's router(s).

This dedicated Internet overlay network has several distinct technical advantages. First, it migrates traffic off the existing interoffice trunk network (which was sized and optimized for voice traffic) to separate dedicated trunks used solely for Internet data traffic. These single purpose dedicated trunk groups can be carefully monitored for overflow and additions made as necessary. The entire PSTN interoffice network will no longer be subject to frequent unpredictable overflow conditions ("hot spots").

Second, the dedicated switches can be sized to deal with the usage characteristics associated with Internet traffic. Given that these dedicated switches are trunk-to-trunk in nature, they can be designed as essentially non-blocking, rather than compromised with the concentration ratios which are a part of every local end office today.

From an end-user customer's perspective, the voice network performance is significantly decoupled from the effects of unpredictable spontaneous overloads resulting from a high number of Internet data-type calls. Slow dial tone, occasionally experienced by customers served by the same end offices as those currently serving ISPs, can be

substantially eliminated as ISPs migrate off local end office switches and onto the dedicated Internet overlay switches. Fast busy signals caused by facility overloads will also be substantially reduced as this data traffic is migrated off the voice-call-optimized PSTN onto the dedicated overlay network.

ISPs will also benefit as they will no longer be subject to the effects of line concentration on their line-type connections to the local end offices which exist today. Migrating their connections to the overlay network, on a T1 and/or PRI interface, can decrease the likelihood of ISP customers being blocked in either the PSTN's interoffice network or in the local end offices. Indeed, the availability of frame relay network connections, should such an option be constructed, will further improve the network connection choices available to ISPs.

Unfortunately, the issue of cost recovery of this new network has not yet been adequately addressed. SNET, like most ILECs, is wrestling with: 1) funding, and 2) determining how to recover this new investment from customers benefiting from the new network. The lack of adequate cost recovery mechanisms stands to stall the construction of dedicated data networks. While no one seems to dispute the legitimacy of such networks to address the shortcomings of today's PSTN to handle data traffic, debate continues regarding the recovery of costs for providing advanced technologies and services.

SNET, switch vendors, and every major ILEC is currently engaged in efforts to develop long term solutions that will move Internet data traffic off the PSTN. An ultimate solution involves a change at the ISP subscriber's end, such that calls to the ISP are never actually received by the local serving office, but rather by a direct link to a separate data network.

However, solutions in the short term that acknowledge the installed base of consumer modems, and that maintain reasonably priced connections for the ISPs, must be developed.

Such interim solutions must protect the PSTN, be cost effective, and be capable of eventually migrating to completely separate data networks.

VII. CONCLUSION

It is now time for the Commission to permit the ILECs to participate in the economic efficiencies of Internet proliferation. ILECs have been incurring costs to protect the PSTN from harm as the patterns of network traffic have been changing due to access to the Internet. ILECs should have appropriate cost recovery mechanisms to allow and encourage the development of new solutions.

SNET values its Internet Service Provider customers, and will continue to render as high a level of service as possible. SNET does not propose that the Commission regulate the Internet, or Internet Service Providers, or end users. SNET does propose that the Commission implement an economically efficient method of pricing, and thereby motivate proper decision-making by all parties. The disproportionate levels of usage resulting from terminating usage on flat-rated ISP exchange lines is causing an adverse impact upon the general body of exchange subscribers, including those who do not access Internet services. It is time for the Commission to implement the policy it adopted fourteen years ago, and assess access charges upon all users of exchange access, regardless of the services they render. The reformed access pricing structure will diminish the inefficiencies produced by the current flat-rate system, and will reduce the cost and service burdens the current system imposes upon exchange line customers.

SNET recommends that the Commission: 1) adopt a Notice of Proposed Rulemaking to propose that its interim exemption of ESPs be discontinued, 2) assess reformed access charges on all users of exchange access, 3) address the loophole contained in the mutual